

Claims

1. Method for trenchless underground laying of pipelines, in which, from a starting shaft, a shield tunnel boring machine and pipes (3) following the latter are driven through the ground (1), the shield tunnel boring machine producing a borehole (2), the diameter of which is slightly larger than the outer diameter of the pipes (3) and the annular space (4) existing between the borehole wall and the pipes (3) being filled with a supporting and lubricating agent,
characterised in that
during the advance, at least in the region of the shield tunnel boring machine or of the first pipe (3) following the shield tunnel boring machine or of the first lubricating station, a continuous or periodic examination of the condition of the ground (1) is carried out and, dependent upon the result of the examination, the ground (1) in the examined region is sealed and/or solidified by a sealing and/or solidifying medium and/or the composition of the supporting and lubricating agent is adjusted.
2. Method according to claim 1, characterised in that the sealing or permeability of the borehole wall is tested by means of a test medium.
3. Method according to claim 2, characterised in that the loss in quantity or pressure loss of the test medium used is determined.
4. Method according to one of the claims 1 to 3, characterised in that the supporting and lubricating agent with a predetermined composition is used as test medium.

5. Method according to one of the claims 1 to 4, characterised in that water or a bentonite suspension or a bentonite-polymer suspension is used as supporting and lubricating agent.
6. Method according to one of the claims 1 to 5, characterised in that a sealing and/or solidifying medium is injected under pressure into the ground in order to seal and/or solidify the ground (1) and changes in the latter into a gel-like or solid state.
7. Method according to claim 6, characterised in that a two or multicomponent medium is used as sealing and/or solidifying medium and is injected in two or more successive phases.
8. Method according to one of the claims 1 to 7, characterised in that the examination and if necessary sealing and/or solidifying and/or adjustment of the composition of the supporting and lubricating agent is repeated at a spacing of a few pipe lengths.
9. Device for implementing the method according to one of the claims 1 to 8, characterised in that, in the region of the shield tunnel boring machine or in one of the front pipes (3), a first test and injection device for the supporting and lubricating agent and also for the sealing and solidifying medium is provided.
10. Device according to claim 9, characterised in that separate lines (7, 11) are provided for the supply of the supporting and lubricating agent on the one hand, and of the sealing and/or solidifying medium or, in addition, for the supporting and lubricating agent, on the other hand, to the test and injection device.
11. Device according to claim 10, characterised in that in the line (11) for the supply of the sealing and/or solidifying medium, a

controllable mixing unit (13) is provided for adjustment of the rheological properties of the sealing and/or solidifying medium.

12. Device according to claim 10 or 11, characterised in that the test and injection device has openings (6) which discharge into the annular space (4) and can be connected respectively to one or to both supply lines (7, 11).
13. Device according to one of the claims 9 to 12, characterised in that at least two blocking elements (14) which delimit the annular space (4) in the longitudinal direction of the pipe are provided between the borehole wall on the one hand and the piping on the other hand.
14. Device according to claim 13, characterised in that the blocking elements (14) can be expanded pneumatically or hydraulically in the radial direction.
15. Device according to claim 13 or 14, characterised in that the mutual spacing of the blocking elements (14) can be changed in the longitudinal direction.
16. Device according to claim 15, characterised in that a first blocking element (14) in the region of the shield tunnel boring machine or in one of the front pipes (3) or the first lubricating station is disposed moveably with the latter and a second blocking element is disposed in a stationary manner in the region of the starting shaft.
17. Device according to claim 16, characterised in that a third blocking element (14) is provided approximately one pipe length behind the first blocking element (14).

18. Device according to one of the claims 12 to 17, characterised in that the openings (6) are disposed distributed uniformly in the circumferential direction and, in order to achieve uniform pressure conditions in the annular space (4), can be individually controlled and activated.
19. Device according to one of the claims 9 to 18, characterised in that a second test and injection device in the piping is provided several pipe lengths behind the first test and injection device.